<u>We Claim</u>:

1.   In an extrusion system comprising an extruder presenting a material inlet and a restricted extrudate outlet, apparatus for delivering material to be extruded to said inlet, and a dryer operably coupled with said outlet for receiving and drying of said extrudate, the improvement which comprises:

a first analyzer operably coupled with said apparatus for analysis of a selected property of said material;

a second analyzer operably coupled with said extruder for analysis of a selected property of said extrudate;

a third analyzer operably coupled with said dryer for analysis of a selected property of the extrudate during or after drying thereof; and

a controller operably connected with said first, second, and third analyzers and with said apparatus, said extruder, and said dryer,

said controller operable to receive analysis data from said analyzers and to adjust the operation of one or more of said apparatus, said extruder, and said dryer to create a desired product from said dryer.

2.   The extrusion system of claim 1, at least certain of said analyzers comprising a transmitting probe operable to generate a signal adapted to pass through a cross-section of the material or extrudate being analyzed, and a receiver probe in opposed relationship to the transmitter probe to receive said signal.

3.   The extrusion system of claim 2, each of said analyzers selected from the group consisting of microwave, infrared, and X-ray analyzers.

4.   The extrusion system of claim 1, said second analyzer comprising an ultrasound analyzer.

5.   The extrusion system of claim 1, said apparatus comprising a feeder adapted to receive incoming raw materials and to deliver such raw materials to said extruder inlet, said first analyzer oriented to analyze a selected characteristic of said incoming raw

material.

6.   The extrusion system of claim 5, said selected property of said material selected from the group consisting of moisture content, protein content, fat content, starch content, particle size, color, and contaminants.

7.   The extrusion system of claim 1, said second analyzer comprising an ultrasound analyzer coupled to said extruder between said inlet and said outlet.

8.   The extrusion system of claim 1, said selected property of said extrudate selected from the group consisting of moisture content, protein content, fat content, starch content, color, viscosity, pH, degree of cook, density, specific gravity, viscosity, porosity and elasticity.

9.   The extrusion system of claim 1, said dryer including an inlet for receiving extrudate from said extruder, a drying chamber, and an outlet for dried extrudate, said third analyzer operably coupled with said dryer adjacent said dryer inlet, said dryer outlet or at said drying chamber.

10.   The extrusion system of claim 9, said selected product of the extrudate during or after drying thereof selected from the group consisting of moisture content, color, density and specific gravity.

11.   The extrusion system of claim 9, said third analyzer comprising a plurality of individual analyzers respectively coupled adjacent said dryer inlet, said dryer outlet, and at least one region within said drying chamber.

12.   The extrusion system of claim 11, said drying chamber including multiple drying flights, there being at least one analyzer associated with each of said drying chamber flights.

13.   The extrusion system of claim 1, said system including a blending device for receipt of waste products, said blending device operable to deliver said waste products to said extruder, there being a fourth analyzer operably coupled with said blending device for analysis of a selected product of the waste products.

14.   The extrusion system of claim 13, said fourth analyzer selected from the group consisting of microwave, infrared, X-ray and ultrasound analyzers.

15.   The extrusion system of claim 13, said fourth analyzer operable to detect a property selected from the group consisting of moisture content, protein content, fat content, starch content, particle size, color, and contaminants.

16.   A method of controlling an extrusion system including an extruder presenting a material inlet and a restricted extrudate outlet, apparatus for delivering material to be extruded to said inlet, and a dryer operably coupled with said outlet for receiving and drying of said extrudate, said method comprising the steps of:

analyzing a selected property of said material using a first analyzer;

analyzing a selected property of said extrudate using a second analyzer;

analyzing a selected property of the extrudate during or after drying thereof using a third analyzer;

directing data derived from said first, second and third analyzers to a controller, said controller coupled with said apparatus, said extruder and said dryer; and

operating said controller in response to said data to adjust the operation of one or more of said apparatus, said extruder and said dryer to create a desired product from the dryer.

17.   The method of claim 16, at least certain of said analyzers comprising a transmitting probe operable to generate a signal adapted to pass through a cross-section of the material or extrudate being analyzed, and a receiver probe in opposed relationship to the transmitter probe to receive said signal.

18.   The method of claim 17, each of said analyzers selected from the group

consisting of microwave, infrared, and X-ray analyzers.

19.   The method of claim 18, said second analyzer comprising an ultrasound analyzer.

20.   The method of claim 16, said apparatus comprising a feeder adapted to receive incoming raw materials and to deliver such raw materials to said extruder inlet, said first analyzer oriented to analyze a selected characteristic of said incoming raw material.

21.   The method of claim 20, said selected property of said material selected from the group consisting of moisture content, protein content, fat content, starch content, particle size, color, and contaminants.

22.   The method of claim 16, said second analyzer comprising an ultrasound analyzer coupled to said extruder between said inlet and said outlet.

23.   The method of claim 16, said selected property of said extrudate selected from the group consisting of moisture content, protein content, fat content, starch content, color, viscosity, pH, degree of cook, density, specific gravity, viscosity, porosity and elasticity.

24.   The method of claim 16, said dryer including an inlet for receiving extrudate from said extruder, a drying chamber, and an outlet for dried extrudate, said third analyzer operably coupled with said dryer adjacent said dryer inlet, said dryer outlet or at said drying chamber.

25.   The method of claim 24, said selected product of the extrudate during or after drying thereof selected from the group consisting of moisture content, color, density and specific gravity.

26.   The method of claim 24, said third analyzer comprising a plurality of individual analyzers respectively coupled adjacent said dryer inlet, said dryer outlet, and at least

one region within said drying chamber.

27.   The method of claim 26, said drying chamber including multiple drying flights, there being at least one analyzer associated with each of said drying chamber flights.

28.   The method of claim 16, said system including a blending device for receipt of waste products, said blending device operable to deliver said waste products to said extruder, there being a fourth analyzer operably coupled with said blending device for analysis of a selected product of the waste products.

29.   The method of claim 28, said fourth analyzer selected from the group consisting of microwave, infrared, X-ray and ultrasound analyzers.

30.   The method of claim 28, said fourth analyzer operable to detect a property selected from the group consisting of moisture content, protein content, fat content, starch content, particle size, color, and contaminants.

31.   In an extruder including an elongated barrel adapted to receive an elongated, axially rotatable screw and presenting a material inlet and a material outlet, the improvement which comprises an ultrasound analyzer operably coupled with said barrel and oriented for generating an ultrasound signal which will pass through material within said barrel during operation of the extruder.

32.   The extruder of claim 31, said analyzer being secured to said barrel between said inlet and said outlet.

33.   The extruder of claim 31, including an infrared analyzer operably coupled to said extruder.

34.   The extruder of claim 33, said infrared analyzer including a transmission probe and an opposed detection probe.

35. The extruder of claim 33, said infrared analyzer in spaced relationship to said ultrasound analyzer.

36. The extruder of claim 31, said ultrasound analyzer operably coupled with a microprocessor for receiving and storing ultrasound analysis data from said ultrasound analyzer.

37. The extruder of claim 36, said analyzer also operably coupled with said extruder for varying the operation of the extruder in at least partial response to said ultrasound analysis data.